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Effects of Partnership Quality and Information Sharing on Express Delivery Service Performance in the E-commerce Industry

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Abstract: This study applies the partnership quality theory to investigate how the perceived information sharing quality from express delivery service providers can affect logistics service performance for online shoppers in terms of partnership quality (including trust and commitment) and willingness to share information from E-commerce enterprises. Based on 421 samples of E-commerce enterprises in China, the results of structural equation modelling revealed that perceived information sharing quality affects partnership trust, which in turn affects the partnership commitment and willingness to share information. Partnership quality and willingness to share information affect the perceived performance of the express delivery services. Surprisingly, information sharing quality does not play a role in commitment. This study provides a theoretical contribution to E-commerce supply chain research in constructing a cognition, affective, behavior, and conative performance model for further research.

Keywords: sustainability; partnership quality; information sharing; perceived performance; express delivery service provider; E-commerce

1. Introduction

In recent years, the vigorous development of the E-commerce industry in China has led to the rapid growth of the express delivery industry. According to statistics from the State Post Bureau of China, China's express delivery business volume reached 63 billion parcels in 2019, and it reached the top of the world for the past six consecutive years [1]. The E-commerce industry has become an important source of China's economic development [2]. In addition to environmental and socio-cultural sustainability, economic sustainability is a crucial aspect in local, regional, and national sustainability [3]. E-commerce has led to economic growth [4] and has yielded sustainability in the local, regional, and national economies [5]. Achieving the sustainable development of the E-commerce industry is a current concern. Economic sustainability is a way for E-commerce enterprises to economize available resources to maximize profits [6]. However, with the rapid development of E-commerce and the express delivery industry, uncoordinated problems between E-commerce enterprises and the express delivery service providers (EDSPs) have gradually been exposed [7,8]. For example, under normal circumstances, online shoppers receive the goods on time after placing orders. During high-volume sales period such as promotion discount periods, online shoppers do not receive the goods on time and then complain about the performance of the logistics service. Satisfying online shoppers via logistics service performance has thus become a critical issue in the E-commerce industry. In many cases, if the EDSPs

can receive the demand forecast and marketing plans for certain products ahead of time from the E-commerce enterprises, they can reallocate their resources to minimize delivery uncertainty. From the online shoppers' perspective, the uncertainty of delivery time is a risk that negatively influences their online purchase decisions [9]. Conversely, from the E-commerce enterprises' perspective, delivery uncertainty is a risk that causes them to lose orders [10]. Therefore, delivery uncertainty becomes a paramount factor that an E-commerce enterprise should consider when sustainability is intended as an order winner [10]. Kot [11] stated that supply chain uncertainty is due to a lack of coordination between partners in the supply chain. Sustainable supply chain involves the coordination between partners to effectively manage the resources to deliver products to the customers. This is because the efficient management of resources among supply chains decreases the environmental impact [12]. Maintaining online shoppers' satisfaction with timely and reliable delivery also creates social sustainability [6]. Kot [11] suggested that sharing the information with all of the partners is unusually essential in a sustainable supply chain, so it is thus necessary to improve the information-sharing mechanisms between E-commerce enterprises and EDSPs to jointly improve the service performance for online shoppers and promote the sustainable development of the E-commerce industry.

Information sharing is a multi-directional process and is an important factor for coordination between parties in a supply chain [13,14]. It also refers to the extent to which crucial and/or proprietary information is available to E-commerce enterprises and EDSPs [15]. In general, EDSPs share dynamic logistics information for parcel receiving, sorting, transportation, delivery, and other processes. However, E-commerce enterprises only provide limited logistics information such as customer name, address, telephone number, and commodity category. E-commerce enterprises are the buyers of the express service. Most E-commerce enterprises are big organizations and EDSPs are more likely small in scale, and this unbalanced seller-buyer bargaining power creates imbalances in information sharing. EDSPs can respond to a sudden increase of express service demand due to the launching new products or destocking of old products if E-commerce enterprises are willing to share—in advance—strategic market information such as dynamic product inventory, demand forecasts, and promotion plans. EDSPs can then promptly coordinate by, for example, increasing manpower and equipment. It is thus important for E-commerce enterprises to be willing to share this type of strategic information. However, E-commerce companies currently are often unwilling to share market strategic information with their EDSPs, for a variety of reasons. Exploring ways to increase willingness among E-commerce companies to share information is therefore necessary.

Hsu et al. [15] identified that the information-sharing capability between buyers and suppliers increases if the relationship between the two is good. Newell et al. [16] also noted that a good partnership boosts information exchange between buyers and suppliers, which can further promote interaction and information sharing between the two parties. For the E-commerce industry, this implies that the relationship between E-commerce enterprises and EDSPs may influence E-commerce enterprises' willingness to share information with their EDSPs. However, the ways to improve the relationship between E-commerce enterprises and EDSPs are another issue.

According to Eagly and Chaiken's [17] ABC (affect, behavior, and cognition) model of attitudes, cognitive attitude affects affective attitude and behavioral attitude. In this case, if an E-commerce enterprise perceives that its EDSP has shared high-quality information, the enterprise will tend to have a better relationship with this EDSP. Referring to Schiffman and Kanuk's [18] CAC (cognitive, affective, and conative) model, if an enterprise has a good relationship with its EDSP, it will have an intention to share information with the EDSP. For e-tailing, E-commerce enterprises should escalate their consumers' service and delivery expectation [19]. Xing et al. [20] suggested that the relationship between online retailers and logistics service providers (LSPs) influences the offering of superior customer service. The relationship between enterprises and EDSPs may thus affect express delivery performance for online shoppers. From the supply chain perspective, the state of the relationship between E-commerce enterprises and EDSPs can be called partnership quality [21] and consists of two

components: trust and commitment. From the E-commerce enterprise perceptive, trust of the EDSP is an affective attitude and the commitment to the EDSP is a behavioral attitude.

This study attempts to construct a cognition, affective, behavior, and conative performance research model to investigate how the perceived information sharing quality from EDSPs can affect logistics service performance for online shoppers through partnership quality (including trust and commitment) and willingness of share information from E-commerce enterprises.

The novelty of this study lies in two aspects. One is to examine the effects of two components of partnership quality since previous studies only used on dimension to reflect the level of partnership quality (e.g., [22]). This study employs two dimensions that enables researchers to distinguish the effect of trust and commitment on conative outcomes. Second, this study alters the concept in information sharing research that information sharing quality and willingness to share information are classified as unrelated independent dimensions (e.g., [23]). This study constructs perceived information sharing quality (from EDSPs) as a cognition factor and willingness to share information (from E-commerce enterprises) as a conative outcome to explore the mechanism of information sharing between E-commerce enterprises and EDSPs. It is the first that attempts to explore the roles of these two dimensions among supply chain members separately and to show that perceived information sharing (from EDSPs) influences E-commerce enterprises' willingness to share information via relationship quality. On the other hand, EDSPs need to deliver a large volume of small packages within a limited of time, and this study contributes to E-commerce supply chain research in synthesizing information sharing with partnership quality for improving express service performance for online shoppers. Finally, sustainability is regarded as a basic goal of supply chain cooperation of supply chain members [24]. Sustainable supply chain confers the ability to cope with uncertainty [13]. This study also promotes the sustainable development of the E-commerce industry by exhibiting the strategic direction that partnership quality is strongly related to the sustainable supply chain management where the information exchange is essential. With the development of global E-commerce, China's E-commerce industry has expanded rapidly and has the largest scale. This research provides valuable knowledge for E-commerce enterprises and EDSPs in other regions to develop their E-commerce.

This paper is organized as follows: in Section 2, literature in information sharing quality, willingness to share information, partnership quality, and perceived logistics service performance are reviewed. Section 3 proposes the research hypotheses and research model, and introduces the data collection and questionnaire design. In Section 4, the validity and reliability of the scales are examined, and the hypotheses are tested using structural equation modelling (SEM). In Section 5, the conclusions are presented, and the theoretical contribution, practical recommendations, and research limitations are put forward.

2. Literature Review

For studying the mechanism of information sharing, a literature review in information sharing quality and willingness to share information was conducted. Because information-sharing behaviors and business partnership quality are closely related [16], therefore, research in partnership quality was also reviewed. Relevant studies were sought for the definition and measurement of the logistics service performance.

2.1. Information-Sharing Quality

Information sharing is based on internet information technology by making use of information sharing among supply chain enterprises in terms of, for example, product supply, inventory level, production delivery, and customer demand [25]. Sharing information aims to coordinate orders in the supply chain can reduce supply chain costs [26], the negative impact of the bullwhip effect [27], and risks and uncertainties [28]. Collaboration through information sharing can thus improve supply chain service performance [29].

Previous studies commonly adopted the quality of information shared [30] to measure information sharing. Myrelid and Jonsson [31] argued that information quality is a general term for companies to measure the timeliness, accuracy, and completeness of information shared between supply chain partners. Improving information quality is important to help partners achieve supply chain cooperation objectives [32]. In this study, information sharing is the information exchange between E-commerce enterprises and EDSPs to coordinate express delivery service supply chain more effectively. Recently, Jie et al. [33] proposed that the timeliness, accuracy, reliability, sufficiency, and credibility of information are the determinants for measuring the quality of information sharing. Based on the previous research results, this paper summarizes the quality of information sharing into five aspects: accuracy, adequacy, timeliness, integrity, and reliability.

2.2. Willingness to Share Information

When studying information sharing, the willingness to share information is a significant attitude for supply chain partners [34]. However, most research on information sharing in the supply chain ignores this component [23]. For effective collaboration, supply chain partners need to provide data on operations as well as finances and strategy willingly [35]. Recently, Du et al. [36] explained that, in the supply chain context, willingness to share information is a trade-off between efficiency and the responsiveness of the information resources. Organizations, therefore, would select certain supply chain partners in whom they feel confident to share information. Du et al. [36] identified that partnership extent and process complexity are antecedents of data dynamism, which directly influence organizations' proactive information-sharing behavior. Willingness to share information can be reactive, but there is a lack of research on this. In such cases, perceived information sharing quality from the supplier is an antecedent factor, and there is a research gap in testing its effect on the willingness to share information from a buyer as a conative outcome.

2.3. Partnership Quality

Partnership is a strategic cooperative relationship established by supply chain companies to achieve common goals, share benefits, and create interdependence [37]. The quality of this partnership is key to the success of supply chains [38,39] because good partnership quality is a crucial precursor for any stable exchange relationship and ensures continuity [40]. However, from the literature, it appears that partnership quality is a complex concept, without a clear, recognized definition [41]. Goles and Chin [42] defined partnership quality as the inherent characteristics that contribute to the exchange of relational resources.

According to the commitment-trust theory of relationship marketing, Morgan and Hunt [21] argued that commitment and trust are 'key' for building a partnership because they encourage marketers to (1) work at preserving relationship investments by cooperating with exchange partners, (2) resist attractive short-term benefits by staying with existing partners, and (3) view potentially high-risk actions as being prudent because of the belief that their partners will not act opportunistically. Researchers in studying partnership quality have followed Morgan and Hunt [21] and commonly included commitment and trust as the two main dimensions of partnership quality in their studies [22].

Moorman et al. [43] defined trust as the willingness to rely on an exchange partner in whom one has confidence. Recently, Jen et al. [44] defined trust as the belief that one can achieve positive outcomes based on the expected actions of collaborative partners. According to social exchange theory, Anderson and Narus [45] reported that exchange outcomes influence trust among partners in a supply chain. Trust will be maintained if the organization obtains the expected exchange outcomes from its partner. Schakett et al. [46] stated that a business partner arrives at the state of trust when a strong relationship bond between buyer and seller is established. Therefore, trust is one of the dimensions to measure the quality of the partnership.

Wibisono et al. [41] defined commitment as the degree to which partner companies work to ensure a continuous partnership. In committing, a firm will be willing to invest financial and physical resources in maintaining the partnership relationship [47]. Relational commitment can thus improve communications and facilitates coordination among supply chains [48]. High partnership commitment promotes the level of cooperation and collaboration for long-term relationships between buyers and sellers [49]. It thus shows that commitment is also one of the dimensions of partnership quality.

2.4. Research in Partnership Quality

The initial research in partnership quality only focused on outsourcing information technology/information systems (IT/IS) services. For example, Lee and Kim [22] evaluated the impact of partnership quality on the success of IS outsourcing in Korea. Lee [50] tested the mediation effect of partnership quality on the relationship between knowledge sharing and outsourcing success in Korean. However, Lee and colleagues used a single dimension to measure partnership quality that consisted of both trust and commitment as measurable items.

The research on partnership quality was later extended to the supply chain context. Lahiri and Kedia [51] examined the mediation and moderation effect of partnership quality between human, organizational, and management capital and firm performance in business process outsourcing in India. Lin [52] examined the mediation effect of relationship quality between socialization mechanisms, technological innovation capabilities, and supply chain integration in Taiwan. More recently, Park et al. [53] investigated the mediation effect of partnership quality between mediated power, non-mediated power, and supply chain performance. All studies followed Lee's [50] single dimension to measure relationship quality.

In this study, partnership quality is defined as the intrinsic characteristics that contribute to a long-term and stable relationship between E-commerce enterprises and EDSPs. Referring to the commitment-trust theory, partnership quality has two dimensions—trust and commitment—but the previous studies in relationship quality in IT/IS and supply chain management only applied a single dimension. There is thus a research gap in testing the individual effect of trust and commitment on both the IT/IS and supply chain contexts. This study attempts to bridge this gap.

2.5. Perceived Logistics Service Performance

Some companies' main purpose in employing LSPs is to increase savings for logistics costs [54]. However, compared with the company's positioning of outsourced logistics services as non-value-added activities, the company's close cooperation with the LSP can better improve its service performance [55]. The level of service performance can thus reflect the level of partnership collaboration between companies and their LSPs.

Lai et al. [56] used seven logistics service indicators to measure the performance of logistics services provided by LSPs to trading companies: customer complaints, satisfaction, reliability, service effectiveness, programme convenience, response speed, and trust. Wieland and Wallenburg [57] supplemented this and identified that service performance in supply chain management includes the timeliness of logistics delivery, customer satisfaction, and flexibility. Liu and Lee [58] also used on-time rate, problem-solving ability, customer satisfaction, and complaint rate to measure logistics service performance. This study adopts the following seven indicators to measure logistics service performance: customer complaints, service satisfaction, response speed, trust of service, service reliability, service effectiveness, and process convenience.

3. Research Hypothesis and Model Construction

3.1. Development of Hypotheses

According to the commitment-trust theory, timely, relevant, and reliable information can create trust in partnerships [21] because information sharing can break corporate boundaries and provide

cooperation, connectivity, and coordination among supply chain partners [59]. In a recent study, Khan et al. [60] also found that the quality of information sharing has a significant impact on trust in the service supply chain. In the E-commerce industry, if the quality of information shared from an EDSP is good, the E-commerce enterprise may thus trust more in this express delivery provider.

Hypothesis 1 (H1). *The quality of information sharing from EDSPs has a positive impact on E-commerce enterprises' trust in the EDSPs.*

Morgan and Hunt [21] stated that if partners provide information, it is easier for them to adapt to each other and adjust their commitment. Information sharing can enhance trust in and commitment to the partnership because it reduces the uncertainty of collaboration [61]. Biggemann [62] also showed that information sharing could promote collaborative relationships between companies, thereby increasing commitment behavior in business cooperation. In the E-commerce environment, the E-commerce enterprise can commit to the EDSP if the enterprise observes that the information sharing quality from the EDSP is good.

Hypothesis 2 (H2). *The quality of information sharing from EDSPs has a positive impact on E-commerce enterprises' commitment to the EDSPs.*

In different supply chain contexts, researchers have indicated that trust is an important factor in building commitment; this includes, for example, hospitals and suppliers [63] and family-business and its strategic partners [64]. If partners perceive trust, they gain their confidence in the cooperation, believe that continuous cooperation is valuable, and make a commitment to the relationship [65]. Brown et al. [66] explained that the more a firm trusts its partner, the more it becomes emotionally attached to and identifies with its partner, and the more affectively it will commit to its partner. The research by Badraoui et al. [67] into Morocco's agri-food supply chains showed that trust enhanced partners' commitment to relationships. Thus, for the E-commerce enterprise, once it has greater trust in its EDSP, it may have a greater willingness to undertake a commitment to that EDSP.

Hypothesis 3 (H3). *The E-commerce enterprises' trust in EDSPs has a positive impact on their commitment to those EDSPs.*

Du et al. [36] found that companies' willingness to share information among members of the supply chain depends on the degree of trust and commitment to partners. Zaheer et al. [68] stated that inter-organizational trust mitigates information asymmetries by allowing more open and honest sharing of information. Zaheer and Trkman [23] also showed that managers' trust in supply chain partners significantly affects their willingness to share information. Therefore, if an E-commerce enterprise trusts its EDSPs sufficiently, it will be willing to share key information with them.

Hypothesis 4 (H4). *The E-commerce enterprises' trust in EDSPs has a positive impact on their willingness to share information with those EDSPs.*

Zaheer and Trkman [23] also found that the commitment of business executives to partners significantly affects the willingness to share information. Without commitment, the willingness of supply chain members to share information in a timely manner will not be strong [35]. Therefore, if an E-commerce enterprise promises to continue to cooperate with its EDSPs, its willingness to share information with its EDSPs will be stronger.

Hypothesis 5 (H5). *The E-commerce enterprises' commitment to EDSPs has a positive impact on their willingness to share information with those EDSPs.*

Previous studies have shown that trust in suppliers significantly affects organizational performance in manufacturing [68] and multinational enterprises [69]. At the same time, trust also significantly positively affects the electronic collaboration of SMEs [70]. Because trust can improve communication between partners, the performance of both parties can be enhanced [71]. The improvement of communication leads to an increase in collaboration among partners, and the collaborative advantage affects firm performance [72]. Therefore, if an E-commerce company trusts its EDSPs more, the logistics service performance for its online shoppers may improve.

Hypothesis 6 (H6). *The E-commerce enterprises' trust in EDSPs has a positive impact on logistics service performance for online shoppers.*

Firms that make commitments are usually willing to invest more resources in supply chain partners to achieve better service performance [21]. Previous studies have supported the finding that commitment has a significant impact on corporate performance [21,73]. Cooperative commitment can suppress opportunism and promote cooperation among members of the supply chain [74]. Therefore, the higher the level of partnership commitment, the more operable the performance will be [75]. Therefore, if an E-commerce company promises continuous cooperation with EDSPs, the EDSPs will be more willing to increase technical equipment, thereby further improving the level of logistics service performance for online shoppers.

Hypothesis 7 (H7). *The E-commerce enterprises' commitment to the EDSPs has a positive impact on the logistics service performance for online shoppers.*

Manufacturers exchange information through integrated information systems linkages with their trading partners to achieve supply chain agility [76]. Increased supply chain agility promotes the company's service performance [77]. Chae et al. [59] found that retailers precede the IT-based inter-organizational linkage effort to share forecasting, inventory, market, promotion, and consumer trend information. This information helps their third-party LSPs to reallocate their resources to provide prompt logistics delivery. Therefore, in the E-commerce environment, if an E-commerce company is willing to share its strategic information with its EDSPs, the EDSPs can use the information to improve their short-term operations (e.g., better fleet management) and develop their long-term business, thereby increasing logistics service performance for online shoppers.

Hypothesis 8 (H8). *The E-commerce enterprises' willingness to share information with EDSPs has a significant impact on the logistics service performance for online shoppers.*

3.2. Research Model

According to the developed hypotheses, a research model was drawn as shown in Figure 1. The perceived information sharing quality (from EDSPs) as a cognitive attitude is the antecedent of partnership quality. The partnership quality (from E-commerce enterprises) is composed of two dimensions: trust is an affective attitude, and commitment is a behavioral attitude. The relationship quality affects the conative attitude, that is, the willingness to share information (from E-commerce enterprises). These three variables affect service performance, that is, the logistics service performance for online shoppers. This research model shows the connections between cognitive attitude, affective attitude, behavioral attitude, conative attitude, and perceived performance. It also shows the links between EDSPs, E-commerce enterprises, and online shoppers.

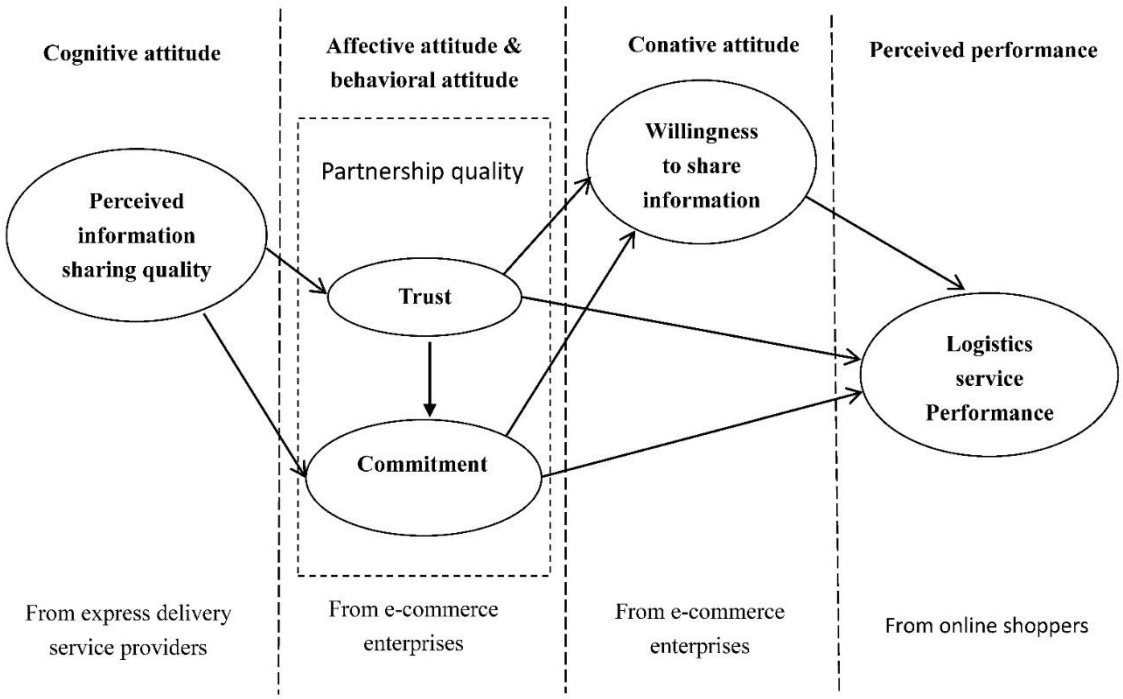

Figure 1. Theoretical model.

3.3. Questionnaire Design and Variable Measurement

The questionnaire consists of three parts: questionnaire introduction, questionnaire text, and respondents' background information. To ensure the reliability and validity of the data measurement, mature scales with high reliability from previous studies were used. At the same time, the semantics were slightly modified as an empirical research tool for data collection in this research setting. Measurement items for partnership quality are from Wang et al. [78] and Caceres and Paparoidamis [79], which included five items for trust and four items for commitment. Referring to Caceres and Paparoidamis [79], trust in this study is defined as the willingness for an E-commerce enterprise to have confidence in an EDSP. Commitment is defined as an enduring desire for an E-commerce enterprise to maintain a valued relationship with an EDSP. The perceived information sharing quality in this study is defined as E-commerce enterprises' assessment of how well the quality of the content of exchange information pass from EDSPs. Referring to Li et al. [80], the attributes of data quality include timeliness, accuracy, adequacy, completeness, and the reliability of information exchanged. The measurement of information sharing quality from the EDSP consists of these five items. Willingness to share reflects a strong internal drive for an E-commerce enterprise to provide operational and strategic information to its EDSP. So that willingness to share information measures three forms of information (inventory, order logistics, and demand forecast) that the E-commerce enterprises tend to be exchanged with the EDSPs (three items). The perceived logistics service performance in this study is defined as an overall judgment regarding the logistics service performed by an EDSP. It is measured with seven items [56]. The items of all variables are designed using a 5-point Likert scale. The measurements are shown in Table 1.

Table 1. Measurements.

Item Code	Description
ISQ1	The information that the express delivery service provider shares with us is timely.
ISQ2	… accurate.
ISQ3	… complete.
ISQ4	… sufficient.
ISQ5	… reliable.
PT1	Our company has a high trust relationship with the express delivery service provider.
PT2	We believe that the express delivery service provider will always keep its promises.
PT3	… the information provided by the express delivery service provider is useful.
PT4	… the express delivery service provider will consider the impact on our company when making important decisions.
PT5	… the express delivery service provider pays attention to the interests of our company.
PC1	We promise not to easily interrupt the cooperation relationship with the express delivery service provider.
PC2	We will continue to maintain our partnership with the express delivery service provider.
PC3	We are willing to provide more support to the express delivery service provider.
PC4	We will take the initiative to renew the contract with the express delivery service provider.
WSI1	We are willing to share inventory information with the express delivery service provider.
WSI2	… share order logistics information with the express delivery service provider.
WSI3	… share demand forecast information with the express delivery service provider.
LSP1	After cooperating with the express delivery service provider, our company receives fewer complaints about logistics services from online shoppers.
LSP2	… online shoppers are satisfied with our logistic services.
LSP3	… online shoppers find our logistics service more reliable.
LSP4	… online shoppers find our logistics service more effective.
LSP5	… online shoppers find our logistics service more convenient.
LSP6	… online shoppers find the response time in logistics service is faster.
LSP7	… online shoppers have more trust in our logistics service.

3.4. Questionnaire Release

The data collection was assisted by the Guangzhou E-commerce Industry Association in providing a member list, which has 600 members. A complete sampling was used to include all the members. Paper questionnaires were sent to the senior staff of these 600 members at the beginning of March 2019. These senior staff are familiar with the express operations of their firms. Follow-up-calls were made to increase the response rate in mid-March and mid-April 2019. On 30 April 2019, 512 sets of questionnaires were collected. The survey response rate is 85.33%. To ensure the validity, objectivity, and scientificity of the statistical analysis of the questionnaire data, data were manually screened, and a total of 421 valid questionnaires were finally obtained (the effective rate was 82.22%). The removed questionnaires were unfinished or their ratings were about the same for most of the questions. The respondents' background information is shown in Table 2.

Table 2. Respondents' background.

Characteristics	Types	Number	Percentage
Position	Senior managers	124	29.45
	Middle managers	202	47.98
	Junior managers	95	22.57
Industry	FMCG and Fresh	96	22.80
	Baby Products & toys	25	5.94
	3C digital products	55	13.06
	Sports products	9	2.14
	Household appliances	14	3.33
	Furniture & household items	41	9.74
	Fashion products	151	35.87
	Others	30	7.13
Employee count	10~20	145	34.44
	21~50	83	19.71
	51~100	125	29.69
	101~200	30	7.13
	Over 200	38	9.03
Online sales turnover (year)	1 million below	144	34.20
	1–5 million	128	30.40
	5–10 million	82	19.48
	10~100 million	32	7.60
	Over 100 million	35	8.31

4. Data Analysis

The data collected by the questionnaire were first tested with SPSS 23.0 (IBM, Armonk, NY, USA) for reliability and validity. Then, based on maximum likelihood estimation, AMOS 23.0 (IBM) was used to evaluate the rationality of the theoretical model and to examine the relationship between variables.

4.1. Reliability Test

Cronbach's Alpha was used to test whether the scale is inherently consistent. The Cronbach's Alpha values of perceived information sharing quality, trust, commitment, willingness to share information, and logistics service performance are 0.877, 0.874, 0.818, 0.793, and 0.892, respectively. The overall Cronbach's Alpha for the scale is 0.880. All of the values for the reliability coefficient of the scales are higher than 0.7, which shows that the reliability of the questionnaire is good, and the data have high reliability [81].

4.2. Validity Test

Using AMOS 23.0 for confirmatory factor analysis, standardized factor loadings, combination reliability (CR) values, and average extracted variance (AVE) values were obtained as shown in Table 3. The standardization factor loadings are between 0.675 and 0.813, CR values are between 0.794 and 0.893, and the AVE values are between 0.531 and 0.589. The model reaches certain requirements in that its CR values are more than 0.60, which means that the internal quality of the model is good. The values of AVE are above 0.50, which means that the model is acceptable [82]. The scale data have good convergence validity.

Table 3. Reliability and construct validity.

Construct	Item	Mean	Standard Deviation	Standardized Factor Loadings	Cronbach's Alpha	CR	AVE
Information sharing quality	ISQ1	3.63	1.228	0.788	0.877	0.878	0.589
	ISQ2	3.77	1.160	0.761			
	ISQ3	3.74	1.217	0.747			
	ISQ4	3.64	1.158	0.756			
	ISQ5	3.75	1.242	0.785			
Partnership trust	PT1	3.85	1.112	0.799	0.874	0.875	0.583
	PT2	3.83	1.156	0.802			
	PT3	3.84	1.169	0.750			
	PT4	3.92	1.139	0.701			
	PT5	3.73	1.186	0.762			
Partnership commitment	PC1	3.68	1.196	0.699	0.818	0.819	0.531
	PC2	3.73	1.222	0.780			
	PC3	3.65	1.152	0.711			
	PC4	3.65	1.195	0.722			
Willingness to share information	WSI1	3.78	1.187	0.711	0.793	0.794	0.563
	WSI2	3.79	1.223	0.807			
	WSI3	3.66	1.193	0.729			
Logistics service performance	LSP1	3.77	1.216	0.754	0.892	0.893	0.544
	LSP2	3.76	1.209	0.813			
	LSP3	3.77	1.216	0.741			
	LSP4	3.75	1.237	0.712			
	LSP5	3.71	1.177	0.675			
	LSP6	3.76	1.197	0.707			
	LSP7	3.73	1.231	0.752			

4.3. Correlation Analysis

Table 4 displays the mean, standard deviation, and correlation analysis results for the core variables of this study. All of the correlation coefficients are less than 0.5, indicating that there is no multicollinearity between the variables. Meanwhile, the square root of the AVE for each variable is larger than its correlation coefficient with other variables, which indicates that each variable has good discriminatory validity.

Table 4. Mean, standard deviation, and correlation analysis.

Construct	Mean	Standard Deviation	PT	PC	WSI	ISQ	LSP
Partnership trust (PT)	3.834	0.940	0.764				
Partnership commitment (PC)	3.680	0.958	0.220 **	0.729			
Willingness to share information (WSI)	3.745	1.010	0.326 **	0.093	0.750		
Information sharing quality (ISQ)	3.710	0.984	0.206 **	0.067	0.098	0.767	
Logistics service performance (LSP)	3.751	0.939	0.434 **	0.423 **	0.345 **	0.370 **	0.738

Note: ** indicates significant at the level of 0.01. The diagonal value is the square root of each variable AVE.

4.4. Path Analysis

The structural equation model and path coefficients are shown in Figure 2. The fitting indices of the structural equation model show that the ratio of the chi-square value to the degree of freedom is 1.077 < 3, RMSEA = 0.014 < 0.08, GFI = 0.951 > 0.9, AGFI = 0.940 > 0.90, CFI = 0.996 > 0.90, NFI = 0.944 > 0.90, RFI = 0.937 > 0.90, IFI = 0.996 > 0.900. The adaptation indicators are thus within the scope of the recommendations, and the model and observation data are suitable [83]. Table 5 shows the results of the path analysis. From the *p*-values of the table (*p*-value < 0.05), all of the hypotheses are supported except for H2 and H5.

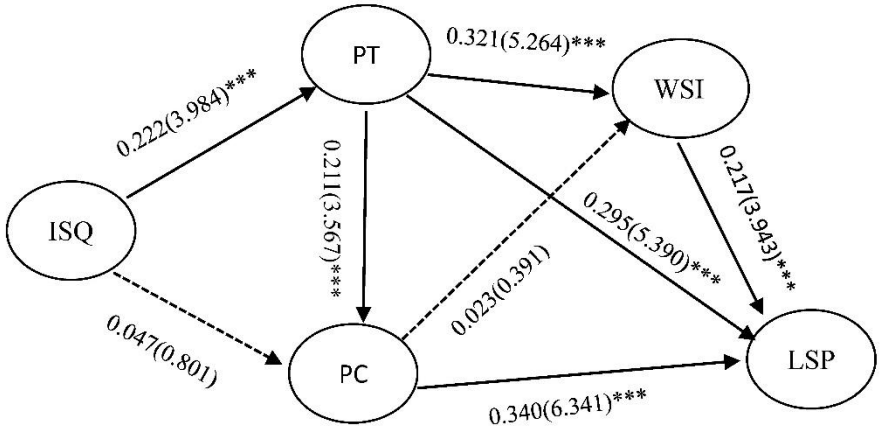

Figure 2. Results of the research model.

Table 5. Path analysis results of structural equation model.

Path	Estimate	S.E.	C.R.	*p*
Information sharing quality → Partnership trust	0.204	0.051	3.984	***
Information sharing quality → Partnership commitment	0.041	0.051	0.801	0.423
Partnership trust → Partnership commitment	0.201	0.056	3.567	***
Partnership trust → Willingness to share information	0.305	0.058	5.264	***
Partnership commitment → Willingness to share information	0.023	0.059	0.391	0.696
Partnership trust → Logistics service performance	0.292	0.054	5.390	***
Partnership comment → Logistics service performance	0.352	0.056	6.341	***
Willing to share information → Logistics service performance	0.226	0.057	6.341	***

Note: *** *p*-value < 0.001.

5. Conclusion and Discussion

5.1. Conclusion

This study shows that perceived information sharing quality has a significant effect on partnership trust. This research result is consistent with that of Khan et al. [60] and Dubey et al. [61], who found that information sharing quality is a contributing factor to partnership trust. However, the perceived information sharing quality does not show any significant effect on partnership commitment. A possible reason for this is that competition is fierce and service homogenization is serious among Chinese express delivery companies. E-commerce companies usually regard price and service as an important factor in choosing and considering EDSPs: they will not easily make a commitment to maintain long-term cooperation with EDSPs based on the quality of shared information.

Referring to the results of previous studies on relationship quality in consumer research, this study found that partnership trust affects partnership commitment in the supply chain context. However, only partnership trust has a significant effect on the willingness to share information. Zaheer and Trkman [23] reached the same conclusion that trust serves as a motivator for organizations to share information with their partners. However, the present study also found that partnership commitment does not motivate e-enterprises to share information with EDSPs. This finding contradicts the findings of the study of Li and Lin [30] on inter-organizational partnerships in manufacturing, that in organizations with a high and low level of information sharing, their level of commitment leads to the difference. Because the dependence of E-commerce enterprises on EDSPs is not as strong as the partnership between manufacturers, the results thus vary.

Both partnership quality (trust and commitment) and willingness to share information have a significant effect on logistics service performance. These results support that of Han et al. [84] and Mofokeng and Chinomona [73], that partnerships have a significant impact on supply chain performance. Fawcett et al. [34] found that willingness to share information significantly affected

performance. This indicates that a good partnership between E-commerce enterprises and EDSPs can strengthen the willingness to share information and further improve logistics service performance.

In future research, researchers should carry out more analysis on relationship quality and its two dimensions combined with different cognitive factors and consequences in different supply chain contexts. In addition, researchers should further explore ways to increase collaboration between E-commerce enterprises and EDSPs to enhance economic, social, and environmental sustainability. Further research is necessary to understand different aspects of information sharing in sustaining E-commerce operations.

5.2. Theoretical Contributions

5.2.1. Partnership Quality Theory

This study contributes to the partnership quality theory in supply chain management by highlighting the mediation role of partnership quality between information sharing and logistics service performance in the E-commerce context. Although the mediation effect of partnership quality in outsourcing IT/IS and supply chain process has been tested [53], the roles of trust and commitment had not been distinguished. This study is thus a pioneer that employs a two-dimension partnership quality model in the supply chain context. The results of this study indicate that only partnership trust shows a full mediation role in the relationship between perceived information sharing quality and willingness to share information. This implies that only when E-commerce enterprises trust their EDSPs are they willing to share strategic information. In this case, trust is a mediator, but commitment is not. However, the results show that trust has a significant direct effect on commitment. This explains that, for building partnership quality, partnership trust is a prerequisite in establishing a commitment to the relationship. To achieve the effect on perceived logistics service performance, both trust and commitment have a significant effect, but commitment shows a higher coefficient than trust. This implies that a committed relationship aims to improve service for the clients (online shoppers). After distinguishing the roles of trust and commitment in forming partnership quality, researchers should increase their interest in employing the two-dimension partnership quality model in their future research.

5.2.2. Information Sharing Research

This study contributes to information sharing research in supply chain management. Most of the previous studies in information sharing among supply chains highlighted on information-sharing quality (e.g., [85]). Although some researchers have considered the willingness to share information, they only studied the factors influencing organizations' intention to share information (e.g., [36]). Some researchers constructed information sharing quality and willingness to share information as two dimensions of information sharing (e.g., [23,80]). This study alters this concept and sets a pre- and post-condition of partnership quality, with perceived information sharing quality from EDSPs as an antecedent and willingness to share information from E-commerce enterprises as an outcome of partnership quality.

This study also constructed a research model (cognition, affective, behavior, and conative performance model) to investigate how the perceived information sharing quality from EDSPs can affect the perceived performance for online shoppers through the willingness to share information from E-commerce enterprises (and partnership quality). In this model, perceived information-sharing quality is a cognition attitude and willingness to share information is a conative attitude. Depending on the actors, the two elements of sharing information can be a cognition attitude or conative attitude. This study enriches our understanding of the information-sharing mechanism among supply chains in different situations.

5.2.3. E-commerce Supply Chain Management

Although there were many studies in the collaboration between enterprises with LSPs in a B2B context (e.g., [73,84]), the studies of EDSPs in E-commerce are rare. In the E-commerce context, the numbers of transactions are huge, although the weight for each shipment is small. Online shoppers are widely distributed, but they require speedy pickup. There is such a big difference in the logistics operations between LSPs and EDSPs. The contents of information for sharing with partners between LSPs and EDSPs also differ. In the B2B environment, LSPs are working between upstream and downstream supply chains, so LSPs can increase B2B connectivity. However, in the E-commerce environment, because the role of EDSPs is underestimated, the collaborative form between E-commerce enterprises and EDSPs is not yet determined. This study shows how E-commerce enterprises can collaborate with EDSPs to enhance logistics services to online shoppers. It contributes to E-commerce supply chain research by exploring the mechanism of information sharing and relationship quality.

5.2.4. Sustainable Development of the E-commerce Industry

This study contributes to the sustainable development of the E-commerce industry. It explores a strategic direction for the E-commerce industry to operate more efficiently and provide prompt delivery to consumers. Constructing a partnership relationship is a strategic direction, and information sharing can strengthen the establishment of partnership relationship. Thus, following this strategic direction, E-commerce enterprises and EDSPs can minimize their resource use and reduce the negative impact on the natural environment as well as reduce operating costs. The enhancement of express delivery contributes to social sustainability by improving customers' satisfaction, as well as improving their quality of life. Providing online shoppers with prompt delivery not only makes online shoppers happy, but also increases the competitive advantages of the E-commerce industry within retail markets. This study, therefore, indicates how E-commerce enterprises can collaborate with EDSPs to form sustainable supply chains that promote social, environmental, and economic sustainability.

5.3. Practical Recommendations

The relationship quality between E-commerce enterprises and EDSPs is the basis for improving logistics service performance. It is, therefore, necessary to strengthen this relationship quality, and this study shows that the quality of information from EDSPs is one way to do so. In general, EDSPs just provide general logistics information, such as ZTO Express. However, most of them focus on the content of information but skip the quality of that information. The information should be timely and reliable. The timeliness and reliability of the information are dependent on the way data are captured and transmitted. To eliminate human input errors, EDSPs can invest in sensor devices that can automatically capture logistics information and link with back-end systems. Data in back-end systems should also be standardized with the systems in E-commerce enterprises.

On the other hand, E-commerce enterprises should share information about existing sales distribution and sales forecast with their EDSPs. This information is useful for EDSPs to plan their future development. For example, EDSPs can consider enlarging their delivery teams to cover larger geographic areas and expand their service coverage. This information also helps EDSPs to enhance their fleet management to provide a more reliable delivery service to online shoppers.

5.4. Limitations

Due to the constraints of the research conditions, this study has certain limitations. Most of the survey samples were concentrated in Guangdong Province. To arrive at more general conclusions, the survey can be expanded to other regions in China or other countries for comparative analysis. This study was also undertaken from the perspective of E-commerce enterprises, but relationship quality is bi-directional, so further studies should be conducted from the EDSP perspective. Researchers should consider revising the model and then collecting data from EDSPs.

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